



**A SHORT PRESENTATION
OF
COASTAL PROTECTION PLAN
FOR THE SOUTHERN ROMANIAN BLACK SEA SHORE
AND
COASTAL PROTECTION AND REHABILITATION PROJECTS
AT MAMAIA SUD AND EFORIE NORD**



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JAPAN INTERNATIONAL COOPERATION AGENCY

ECOH CORPORATION

1. Background of Project

Romania has a territorial coastline extending over about 240 km along the northwestern side of the Black Sea. In the past several decades, however, the Romanian Black Sea shore has been suffering from serious beach erosion problems. The northern unit of the Romanian coastal area, which is designated as the Danube Delta Biosphere Reservation, is most affected, but its southern unit is also in danger where the economical activity is strong, including the tourism industry.

The coastal erosion not only threatens the tourism industry in summer season through the loss of beach area but also endangers the safety of housing and public welfare. A project for the protection and rehabilitation of the southern Romanian Black Sea shore is urgently needed. Upon the request of the Government of Romania, the Government of Japan decided to make a technical cooperation for the Study on Protection and Rehabilitation of the Romanian Black Sea Shore (hereinafter referred to as “the Study”) through the Japan International Cooperation Agency (hereinafter referred to as “JICA”), which contracted ECOH CORPORATION for execution of the Study..

The Study was undertaken since March 2005 by a team of experts contracted by JICA and the Interim Report was submitted to the Ministry of Environment and Water Management in February 2006. The Study will be concluded in September 2006 by submission of the Final Report.

2. Objectives of Project

The project for the protection and rehabilitation of the southern Romanian Black Sea shore aims at stopping the coastal erosion and increasing the asset value of coastal zone with new beach areas. The Study by JICA has the objectives of formulating a master plan for coastal protection aimed at the year 2020 and making a feasibility study on the selected priority projects so that the Government of Romania will be able to implement the priority projects for coastal protection and rehabilitation with appropriate funding.

3. Summary of Coastal Protection Plan

3.1 Sectorial Division of Coastal Area

The area under study covers the coast from Cape Midia in the north and Vama Veche in the south. The coastal area is divided into seven sectors and twenty sub-sectors for convenience of the Study, as shown in Fig. 1. The total length of the coastline is about 80 km, but the study area extends over the length of about 59 km by exclusion of the port areas of Midia, Constanța, and Mangalia.

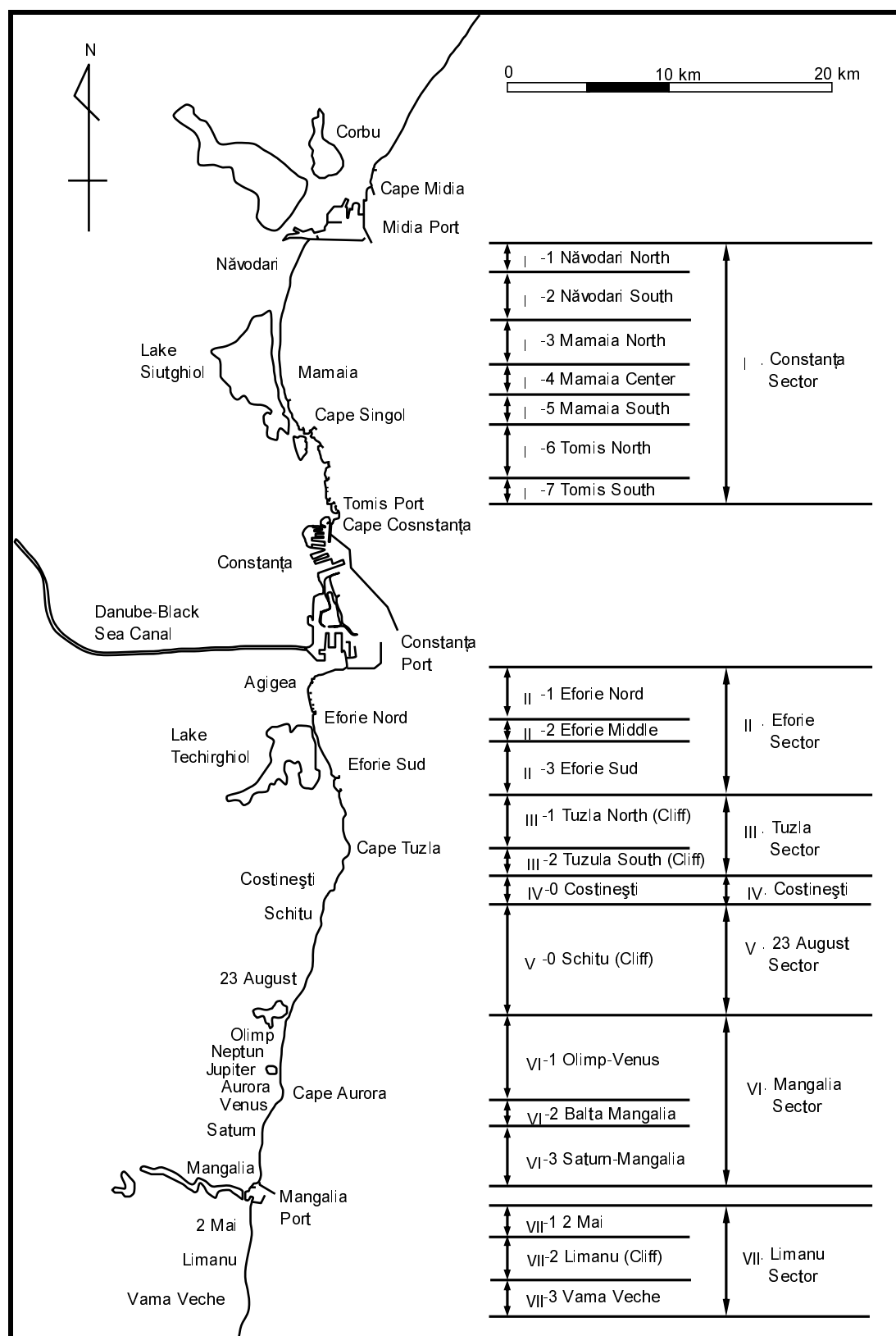


Fig. 1: Map of sector and sub-sector division of the study area

3.2 State of Beach and Cliff Erosion

Most of the study area is being eroded with the rate of up to 2.0 m per year. The southern part of Mamaia Beach is subject to the severest erosion. Without countermeasures against beach erosion, the shoreline is expected to retreat by 70 m on the average in twenty years; sandy beaches will disappear and some hotels will be susceptible to the danger of total collapse.

Many cliffs are also being eroded by wave abrasion at their feet and/or slip failure in their upper part due to the rise of ground water table during heavy rain etc. The northeastern part of Constanța City and the shore side of Eforie City have many housings and buildings near the edges of the cliffs. The cliffs in the study area have been eroded with the rate of about 0.6 m per year in the place where no protective measures have been implemented.

3.3 Proposed Plan for Coastal Protection

The Study is proposing construction and renovation of various shore protection facilities along the coast. Figs. 2 to 4 show the existing shore protection facilities and proposed plan of new facility installation for the study area.

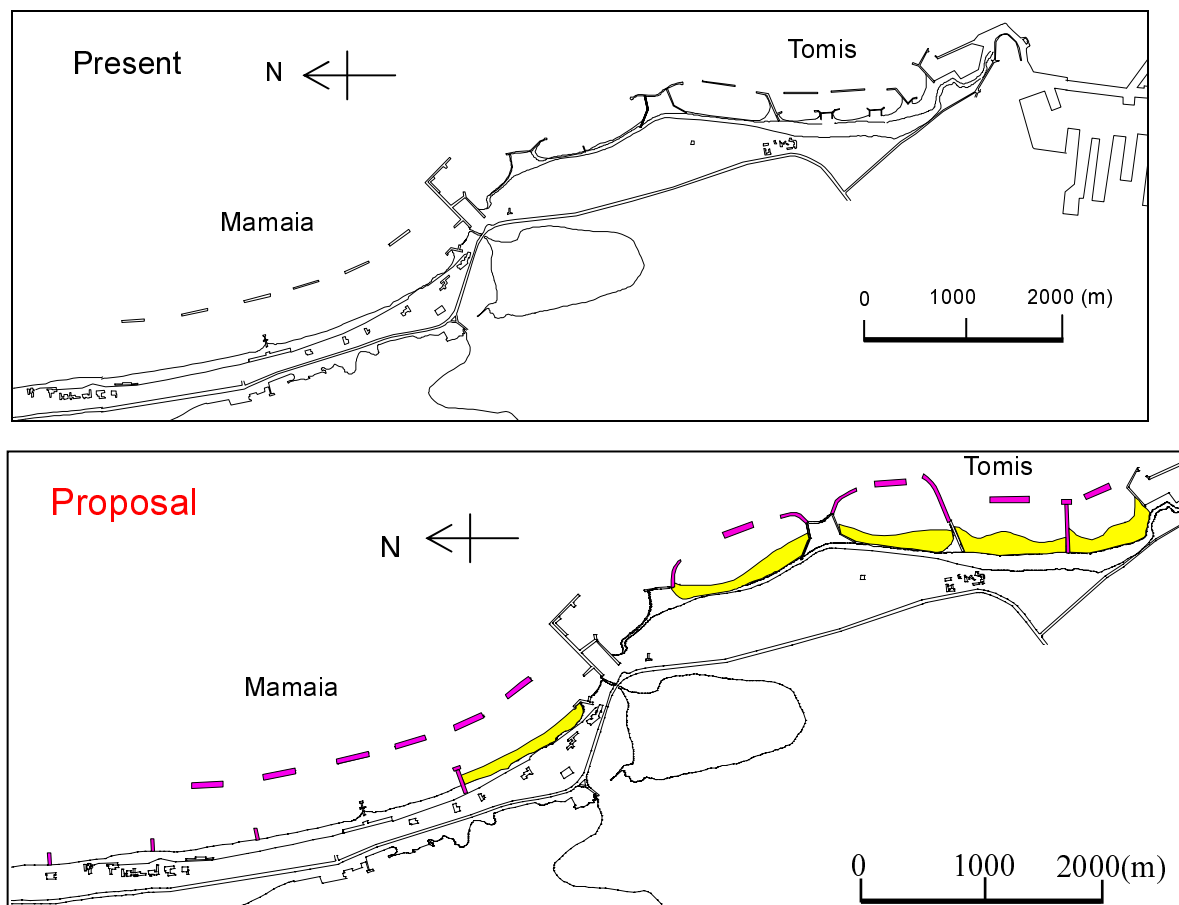


Fig. 2: Existing shore protection facilities and proposed plan at Mamaia and Tomis areas

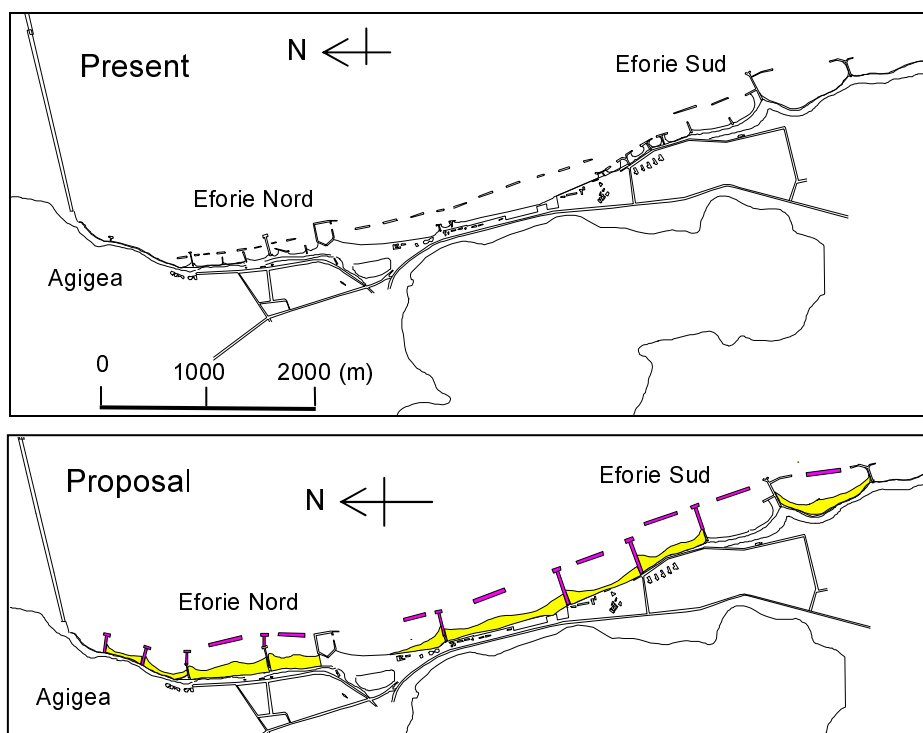


Fig. 3: Existing shore protection facilities and proposed plan at Eforie areas

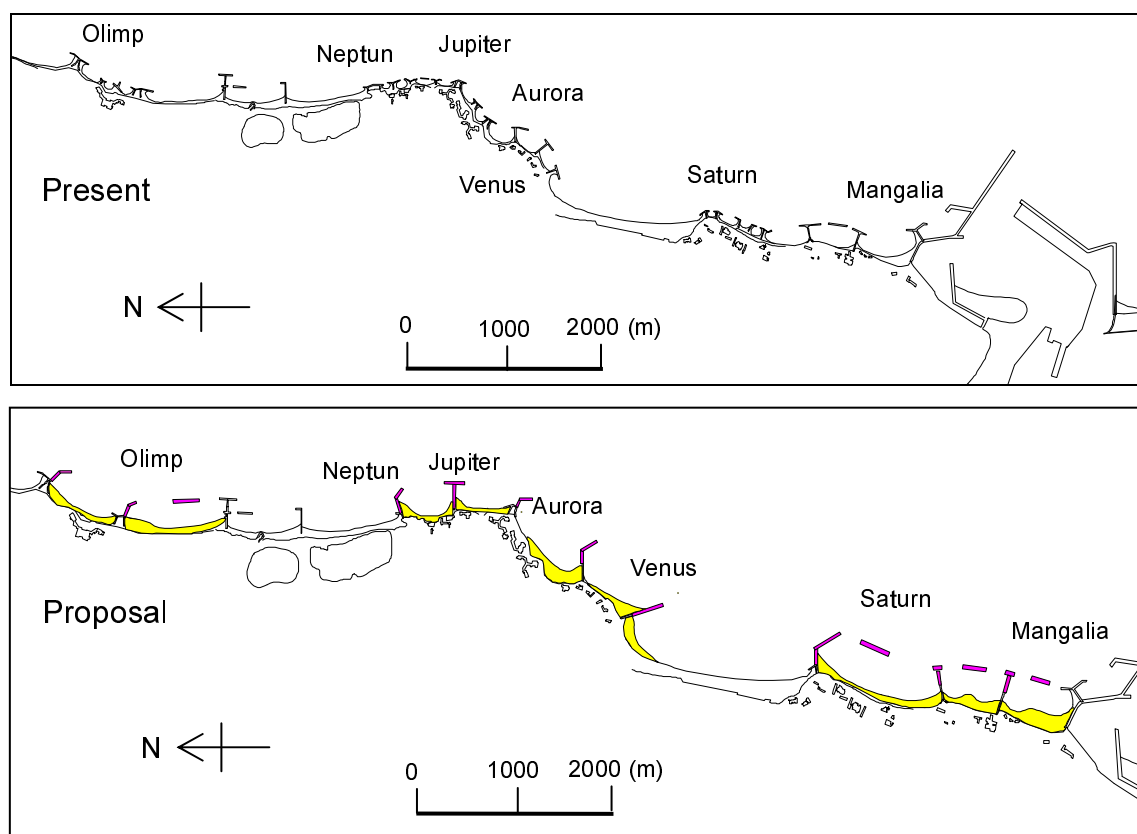


Fig. 4: Existing shore protection facilities and proposed plan at the areas from Olimp to Mangalia

Table 1: Tentative estimate of construction cost for proposed coastal protection plan

Sub-Sector		Item	Quantity of project	Approximate Cost (thousand Euro)
Mamaia North		2 new submerged groins	200 m in total	280
Mamaia Center	(1)	2 breakwaters (rehabilitation)	500 m in total	5,020
	(2)	2 breakwaters (rehabilitation) 1 new submerged groin	500 m in total 100 m long	5,020 140
Mamaia South		2 breakwaters (rehabilitation)	500 m in total	5,020
		1 groin	200 m long	690
		Beach fill	180,000 m ³	4,730
Mamaia subtotal				20,900
Tomis North		2 new long jetties	640 m in total	8,490
		1 new artificial reef	250 m	3,700
		Beach fill	270,000 m ³	7,070
		Removal of existing facilities		750
Tomis Center		2 new long jetties	740 m in total	9,960
		1 new artificial reef	250 m	3,700
		Beach fill	220,000 m ³	5,790
		Removal of existing facilities		970
Tomis South		1 new long jetty	440 m in total	4,140
		2 new artificial reefs	550 m	8,080
		Beach fill	370,000 m ³	9,650
		Removal of existing facilities		1,410
Tomis subtotal				63,710
Eforie Nord (1)		2 new jetties and 2 jetties rehab.	650 m in total	6,400
		2 new artificial reefs	550 m in total	10,350
		Beach fill	340,000 m ³	7,780
		Removal of existing facilities		500
		Temporary 2 access road	1,700 m in total	330
Eforie Nord (2)		2 new jetties	380 m in total	2,220
		Beach fill	60,000 m ³	1,460
		Removal of existing facilities		130
Eforie Middle		2 new jetties	630 m in total	5,340
		2 new artificial reefs	500 m	7,390
		Beach fill	430,000 m ³	10,130
		Removal of existing facilities		100
Eforie Nord and Middle subtotal				52,130
Eforie Sud (1)		2 new jetties	480 m in total	7,280
		2 new artificial reefs	550 m in total	8,080
		Beach fill	380,000 m ³	8,820
		Removal of existing facilities		1,600
Eforie Sud (2)		2 new artificial reefs	600 m in total	8,760
		Beach fill	260,000 m ³	6,200
		Removal of existing facilities		450
Eforie Sud subtotal				41,190
Olimp–Venus		7 new jetties	1,630 m in total	20,900
		1 new artificial reef	250 m	4,740
		Beach fill	540,000 m ³	15,370
		Removal of existing facilities		3,760
Olimp–Venus subtotal				44,770
Saturn–Mangalia		3 new jetties	600 m in total	7,210
		3 new artificial reefs	610 m in total	10,210
		Beach fill	160,000 m ³	4,550
		Removal of existing facilities		3,390
Saturn–Mangalia Subtotal				26,320
Jetty, groin & breakwater		Total length	8,190 m	89,070
Artificial reef in total		Total length	4,110 m	65,010
Beach fill in total		Total volume	3,210,000 m ³	81,550
Removal of existing facilities and access road				13,390
Grand total				249,020

Note: The above grand total is for the net construction cost. The project cost inclusive of engineering service, operational and maintenance cost, and physical contingency but exclusive of price contingency will be 316 million Euro.

The shaded areas in yellow color along the shoreline in Figs. 2 to 4 indicate the beach fill with supply of the sand brought from outside sources. The total amount of beach fill sand is estimated as about 3.2 million cubic meters. The sand for beach fill is contemplated to be mined from the riverbed of the Danube between Călărași and Cernavodă and carried to the shore by dump trucks after transported by hopper barges through the Danube and Black Sea Canal.

The coastal protection plan proposes rehabilitation of six detached, deteriorated breakwaters at Mamaia, construction of twenty-five new jetties, and installation of eleven wide-crested, submerged breakwaters as listed in Table 1.

The plan has been formulated under the following principles:

- 1) Provision of sufficient protection for the shore sectors under severe beach erosion,
- 2) No new protection for cliff coast under natural erosional process,
- 3) Creation of broad beaches for future development of summer tourism,
- 4) Remedy of the present water pollution problem in the inshore zone owing to the layout of existing groins with quite narrow spacing, and
- 5) Make an ideal plan based on the most advanced technology of coastal protection engineering.

The total cost for executing the whole plan is tentatively estimated at 316 million Euro¹ based on the price in 2005 without inclusion of the price contingency.

3.4 Implementation Schedule

The schedule of implementing the above coastal protection plan is proposed as listed in Table 2. The whole implementation period is divided into two stages, the first one from 2007 to 2020 and the second stage from 2021 and afterward. The first stage is divided into three phases. In the first phase, undertaking of two priority projects at Mamaia Sud and Eforie Nord is proposed.

The estimated project cost for the first phase of the first stage is listed in the second column of Table 2.

¹ Cost estimate is being revised and the final estimate will be presented in the Interim Report in March 2006.

Table 2: Implementation Schedule of Coastal Protection Plan

Item	First Stage				Second Stage	Total
	First Phase	Second Phase	Third Phase	Overall		
Implementation period	2007 – 2010	2011 – 2015	2016 – 2020	2007 - 2020	After 2021	
Project sites	Mamaia South with parts of North and Center Eforie Nord (1)	Mamaia Center(1) Tomis North Eforie Middle & Rehab. for Olimp to Mangalia	Mamaia Center(2) Tomis Center Eforie Nord (2) Eforie Sud (1) & Rehab. for Olimp to Mangalia	Mamaia to Eforie Sud & Rehab. for Olimp to Mangalia	Tomis South Eforie Sud (2) Olimp to Mangalia & 2 –Mai to Vama Veche	
Feasibility study Cost of F/S	JICA grant	New contract 1.5 million Euro	New contract 1.5 million Euro	3.0 million Euro	4.0 million Euro	7.0 million Euro
Eng. service(D/D) Cost of D/D	New contract 2.8 million Euro	New contract 3.9 million Euro	New contract 4.5 million Euro	11.2 million Euro	8.2 million Euro	19.0 million Euro
Net construction cost	36.2 million Euro	50.8 million Euro	57.9 million Euro	144.9 million Euro	107.1 million Euro	252.0 million Euro
Operational and maintenance cost	1.2 million Euro	2.4 million Euro	3.4 million Euro	7.0 million Euro	5.8 million Euro	12.8 million Euro
Contingency	3.6 million Euro	5.1 million Euro	5.8 million Euro	14.5 million Euro	10.7 million Euro	25.0 million Euro
Approximate project cost	43.8 million Euro	63.7 million Euro	73.1 million Euro	180.6 million Euro	135.8 million Euro	316.4 million Euro

Note 1: All costs are based on the price in 2005 and do not include the price contingency.

Note 2: The cost estimate in the first phase is based on the condition that sand mining from the riverbed of the Danube is authorized and the sand can be utilized for beach fill. If the river sand is unable to be used by environmental protection reasons and the sand from the seabed off Midia Port is to be utilized, the cost estimate is altered as follows:

Cost of engineering service:	4 million Euro
Net construction cost:	60 million Euro
Operation and maintenance cost:	2 million Euro
Contingency	6 million Euro
Approximate project cost	72 million Euro

4. Summary of Two Priority Projects

4.1 Coastal Protection and Rehabilitation of Mamaia Sud Sector

The components of the coastal protection and rehabilitation project at Mamaia Sud are as follows:

- 1) Rehabilitation of two existing breakwaters,
- 2) Sand-retaining groin of 210 m long,
- 3) Beach fill with the sand volume of 180,000 m³, and
- 4) Three short groins of 100 m long each.

Fig. 5 shows the project area and layout of the project components. The shaded area in brown color next to the shoreline is the area of beach fill. The two breakwaters to be rehabilitated are located within the project area. The sand-retaining groin and three short submerged groins are located at the north of the beach fill area.

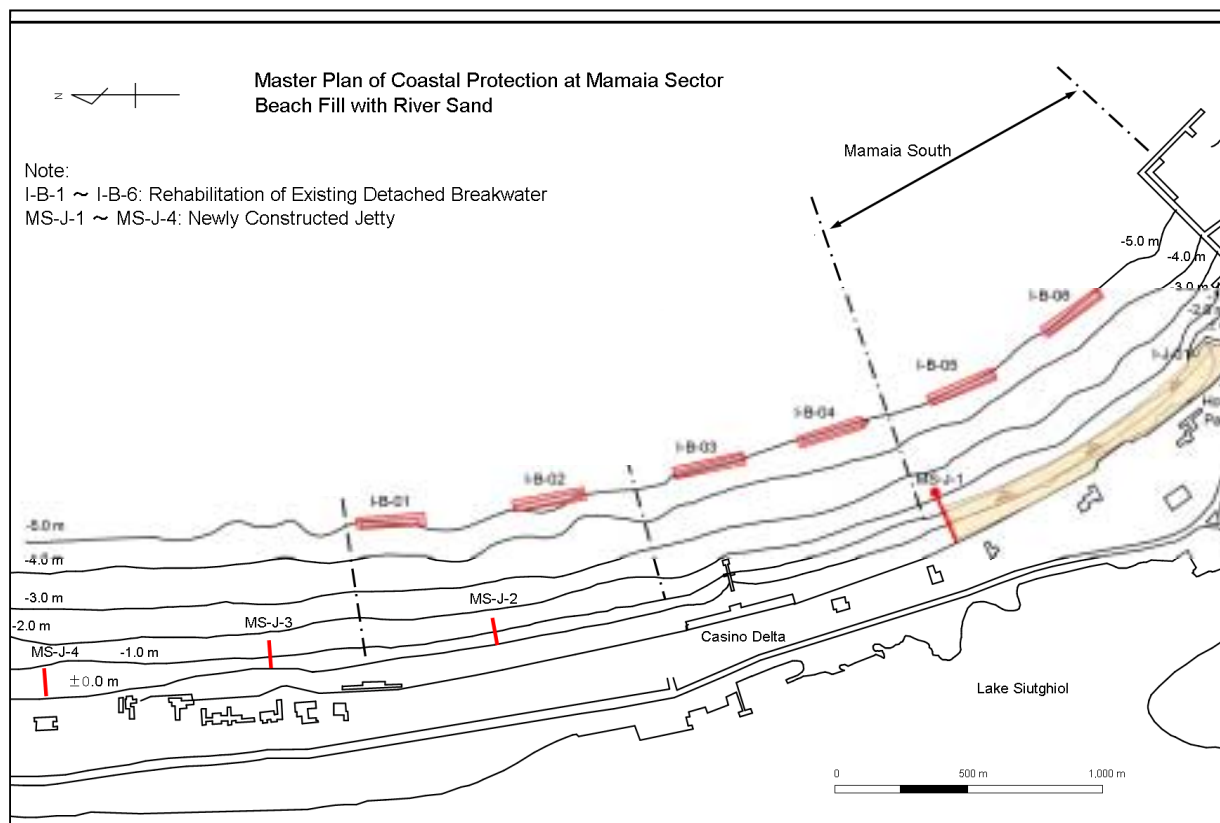


Fig. 5: Area and layout of the components of the priority project at Mamaia Sud

4.2 Coastal Protection and Rehabilitation of Eforie Nord Sector

The components of the coastal protection and rehabilitation project at Eforie Nord are as follows:

- 1) Two T-shaped jetties (250 m long),
- 2) Two wide-crested, submerged breakwaters (275 and 325 m long), and
- 3) Beach fill (330,000 m³).

Fig. 6 shows the project area as indicated as “Eforie Nord (1)” and the layout of the project components. The shaded area in brown color next to the shoreline is the area of beach fill. The two T-shaped jetties have the wing sections of 30 m long at their heads. The submerged breakwaters, which will not obstruct the view of beach users, are located at the outer edge of the T-shaped breakwaters.

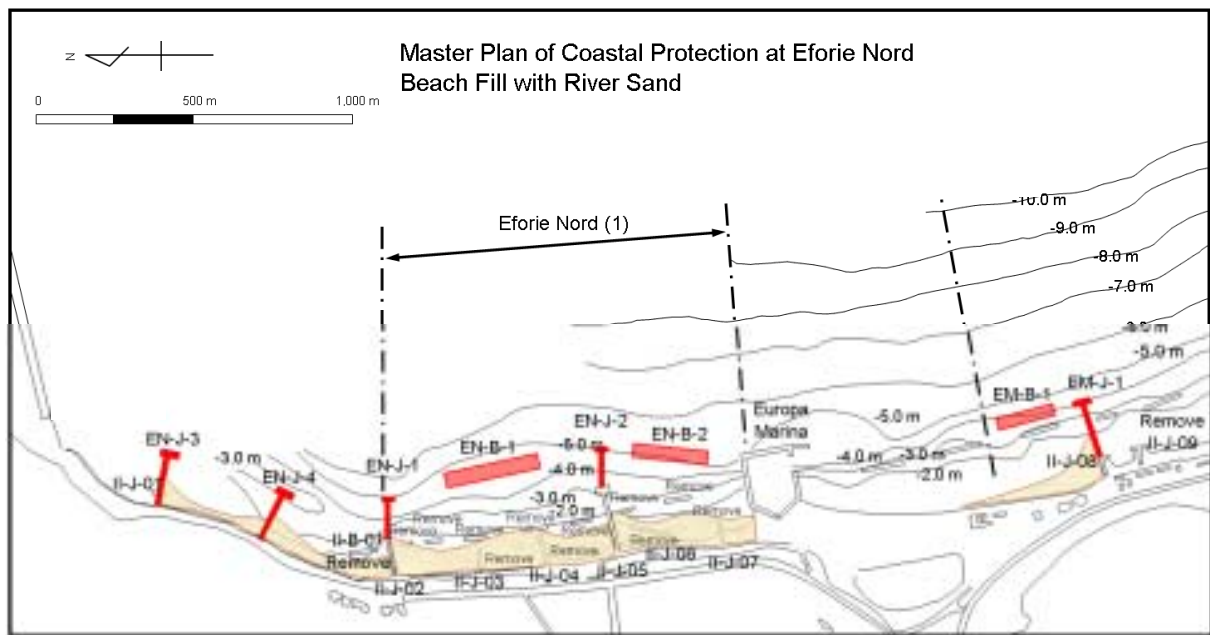


Fig. 6: Area and layout of the components of the priority project at Eforie Nord

4.3 Estimated Cost of Priority Projects

The approximate cost for the priority projects of coastal protection at Mamaia Sud and Eforie Nord is estimated as follows:

Net construction cost:	36.2 million Euro
Cost of engineering service:	2.8 million Euro
Operation and maintenance cost:	1.2 million Euro
Contingency:	3.6 million Euro
 Total cost:	 43.8 million Euro

The above estimate does not include the price contingency.

5. Assessment of Environmental Impacts and Mitigation Measures

Initial examination of the environmental impacts has been made by the National Institute of Marine Geology and Geo-ecology (GeoEcoMar) under the subcontract from ECOH CORPORATION. The report was submitted in February 2006 and will be made available for the parties concerned.

The Coastal Protection Plan for the Southern Romanian Black Sea Shore is being subject to the strategic environment assessment (SEA) specified by the Romanian Government Decision no. 1070/2004. A working group for preparation of the environmental report will be organized by the Water Department of the Ministry of Environment and Water Management in due course. The procedure for the environment impact assessment (EIA) for the priority projects at Mamaia Sud and Eforie Nord will probably be initiated in May 2006.

One of foreseeable impacts is the sand mining from the riverbed of the Danube, the operation of which may affect the river courses of the Danube. However, compared with the Danube Navigation Improvement Project, which is under discussion, the impact will be much small because the annual amount of the sand to be mined is less than 200,000 cubic meters. There are a few more items to be examined for environmental impacts such as the quality of sand if it may contain materials harmful for beach fill and the impact of beach fill on benthos and benthic plants by beach fill. These questions will be clarified during the stage of feasibility study.

The Study is expecting that some minor impacts may emerge during the forthcoming environmental study but they will be easily mitigated by appropriate measures. The application for the environmental impact assessment will be soon submitted to the Regional Environmental Protection Agency in Galati by the Water Department of the Ministry of Environment and Water Management and the environmental agreement for the priority projects at Mamaia Sud and Eforie Nord will be issued in due course.